

ZANZIBAR PROTECTORATE

ANNUAL REPORT

ON THE

DEPARTMENT OF AGRICULTURE

for the year ended 31st December, 1937

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DEPARTMENT OF AGRICULTURE.

STAFF.

Rank.	Name.
Director	... A. J. Findlay, M.A., B.Sc.Agric. (Aber), N.D.A., N.D.D. (until September 18th). R. W. R. Miller, B.A. (Camb.), Dip.Agric. (Camb.) (from September 30th).
Senior Agricultural Officer	... J. C. Muir, B.Sc.Agric. (Glas.), N.D.A., N.D.D. (Acting Director from February 21st to October 28th).
Agricultural Officers	... { J. E. Baker, Cert.Agric. (Seale Hayne). R. Johns, N.D.A., C.D.A. (Aberystwyth), A.I.C.T.A. (Trinidad). F. B. Wilson, M.A. (Cantab.), Dip.Agric. (Cantab.), A.I.C.T.A. (Trinidad). G. E. Tidbury, B.Sc., A.R.C.S., A.I.C.T.A. (Trinidad).
Manager of Plantations	... I. G. C. Squire.
Inspector of Produce	... A. C. E. Callan (from March 1st).
Government Chemist	... L. W. Raymond, B.A., B.Sc. Hons. (London), A.R.C.S., A.I.C.
Silviculturist	... L. G. T. Wigg, B.A.Forestry (Oxon), Dip.Forestry (Oxon). B.A., Hons.Botany (Oxon).
Veterinary Officer	... Fazal Din Ahmedi (from July 31st).

SECTION I.

AGRICULTURE IN THE PROTECTORATE.

GENERAL.

From the appointment of Mr. R. N. Lyne as Director of Agriculture in 1896 until the retirement of Mr. V. H. Kirkham from the office of Director of Agriculture in 1931 the Department of Agriculture expended its main energies in the maintenance and care of the Government Plantations, which indeed at times have proved a source of considerable profit to Government.

Various tentative trials with crops other than cloves and coconuts were made from time to time but no sustained policy of experimentation into the possibility of developing exports other than cloves and copra was carried out.

No records remain of any continued efforts to improve the condition of the producer by the institution of better cultural methods or manurial practice, by the improvement of his stock and most important in the betterment of his diet.

As long as Zanzibar cloves maintained their monopoly of the world's market without serious competition from Madagascar or artificial vanillin the situation adjusted itself but with the collapse of prices for all primary products and the insidious spread of disease amongst the clove groves the necessity for a more scientific knowledge of the industry's requirements became imperative and during the late Director's tenure of office considerable progress has been made.

Kizimbani Experiment Station was opened in 1932, and since then a programme of work has been planned to place the clove industry on an economic basis and to raise the quality of Zanzibar copra from the depths where it had stayed since it was first exported.

The retirement of a Director of Agriculture provides a suitable opportunity to review the general condition of agriculture in the Protectorate.

Until the appointment of Mr. A. J. Findlay as Director of Agriculture in 1931 the two main crops, cloves and coconuts, had been treated as forest crops and the system of farming might best be described as ranching especially in the years when slave labour gave way to paid labour.

No attempts had been made to study the life history and requirements of the clove tree, no efforts made to distinguish between high and low yielding strains, and no work had been undertaken to ascertain whether clove trees were being grown economically or otherwise.

The work of the last few years (and for this work the services to Zanzibar of Mr. L. G. T. Wigg of the Tanganyika Territory Forestry Department are highly appreciated) has shown amongst other important factors that there is a very considerable difference in the crop produced by different clove trees.

This piece of knowledge opens up a very wide field of speculation as to the future of the clove industry in Zanzibar and Pemba and in the course of a few years' time when it has been ascertained if the progeny of the higher yielding

trees retain this character it will be necessary to determine whether the industry shall maintain its present output by considerably reducing the acreage under cloves or whether the correspondingly cheaper production will allow the expansion of the industry into larger and cheaper markets, such as that which is supplied by artificial vanillin.

The marked improvement in the quality of the copra exported during the last two years by the recently inaugurated policy of agricultural education and propaganda shows how far there is still to go in this direction. The quality of Zanzibar copra is still markedly inferior, and although the climate may perhaps never allow it to compete with the very highest grades, there is nevertheless room for a very considerable improvement which could be effected at small expense and which would result in a great increase in the value of copra exported.

It is estimated that the value of copra improvement to the producer is already from Shs. 5 to Shs. 7/50 per ton on account of the cessation of arbitration on consignments delivered abroad. This represents from £3,000 to £5,000 per annum on normal exports.

A considerable amount of work has been done in the improvement of the local poultry but the fringe of the problem has hardly been touched—while the possibilities of creating a local livestock industry are even now only being explored.

The work of the recent nutrition committee has revealed the poverty of the poor man's diet and one of the most urgent problems is the introduction of more suitable crops for the small producer and the provision for him of a cash crop by means of which he may be able, coupled with his own agricultural efforts, to provide a more balanced diet for his family—attention also is being paid to the introduction of better yielding types of pulses, maizes and cassavas.

Observation work on different varieties of pineapple has shown that in Zanzibar the Smooth Cayenne pineapple attains a size and flavour hardly experienced in any other country in the tropics and the possibility of providing an additional export crop by the canning of pineapples or pineapple juice is being explored.

There have been complaints of labour shortage, which are usual in years of large crops, and there is no doubt that at least ten per cent of the clove crop has been left on the trees especially in the north of Pemba.

There is no real lack of labour but there is an urgent need for its proper organization and control. Sixty thousand pickers working for sixty days and only picking forty lbs. of green cloves each a day would clear a crop of thirteen lakhs of frasilas in sixty working days and when it is considered that a considerable proportion (up to one-third) of the crop is picked out of the rush of the harvest the present labour force, if properly organized, could comfortably pick a much larger volume.

Early in the year the Protectorate was visited by Sir Frank Stockdale, K.C.M.G., C.B.E., Agricultural Adviser to the Secretary of State for the Colonies, who examined in detail the work of the Department.

During this visit the incidence of the "sudden death" of clove trees was investigated and the knowledge gained by previous scientific workers reviewed with the result that the Colonial Development Fund later in the year made a free grant of £3,000 for the elucidation of this grave problem.

It is intended to appoint a scientific officer who will attack the problem under the technical direction and with the co-operation of the East African Agricultural Research Station at Amani.

The year has been one of marked prosperity for the plantation owners and agricultural workers of the Protectorate for the coconut crop has been a good one and prices remunerative while the clove crop of the seasonal year 1937-38 has been a record one and the bulk of it was sold to the Clove Growers Association at a good price during 1937. The demand for labour was acute during the latter half of the year and the earning capacity of labourers was higher than for many years.

The Department was seriously short of senior staff during the greater part of the year owing to unavoidable transfers, leave, temporary secondment and retirement of officers.

WEATHER.

The rainfall in the clove areas of the Protectorate was slightly above the average of the previous four year period although considerably less than that of 1936. The distribution of the rain was abnormal in that the late rains were early and unusually heavy.

The first two months of the year were extremely dry and a spell of rain in the first fortnight of March brought a welcome respite. This was followed by a further dry period of ten days duration which was common throughout the clove areas of both islands. Rain became general towards the end of March and fell almost daily until the middle of May in Zanzibar and the end of the month in Pemba. The planting season was marked by well distributed rains which were, however, considerably below the average of the previous four year period in Zanzibar where the rainfall for the first six months of the year was some twenty per cent lower than the average of the corresponding four year period, only fifty per cent of the annual rainfall falling within the first six months compared with an average of seventy per cent during the first half of the previous four years.

In Pemba conditions more nearly approximated to the average, for in the first half of the year some seventy per cent of the annual rainfall was recorded in comparison with an average of seventy five per cent during the same period of the previous four years.

June and July were very dry months in both islands, mature clove trees in some areas losing much of their foliage and the prolonged dry spell retarding the development of clove buds. Seedling cloves which had been planted out in favourable circumstances early in the second quarter of the year suffered greatly from the drought and early planted food crops gave poor yields in Zanzibar.

The light rains of August were normal but the late rains which occurred in Zanzibar from September to the middle of December were above average and interfered greatly with clove harvesting and caused deterioration in the quality of the crop. In Pemba the August and September rains were slightly below average and clove harvesting was not seriously interrupted until mid October, the quality of the Pemba crop being generally better than that of Zanzibar.

Meteorological Observations form Appendices I, II and III.

DOMESTIC EXPORTS.

Table I presents a summary of the value of agricultural exports. The decline in the quantity of cloves exported is principally due to lack of exports to India. The shortfall is in part counterbalanced by the export of clove stem oil. The rise in the quantity and value of coconut products and of hides and skins is noteworthy.

TABLE I.

DOMESTIC EXPORTS, 1932-37.

Item.	Unit.	1932.		1933.		1934.		1935.		1936.		1937.	
		Quantity.	Value. £	Quantity.	Value. £	Quantity.	Value. £	Quantity.	Value. £	Quantity.	Value. £	Quantity.	Value. £
Cloves	Cwt.	162,054	487,395	215,325	496,265	217,514	477,663	189,771	474,513	205,687	618,671	121,128	411,654
Clove oil	Lbs.	—	—	—	—	—	—	—	—	57,633	8,645	652	98
Stem oil	Lbs.	—	—	—	—	—	—	—	—	4,418	663	94,617	11,723
Copra	Tons.	11,804	143,507	12,244	105,271	12,607	71,463	11,694	120,352	13,037	142,686	14,411	204,192
Coconut oil	Lbs.	67,715	749	59,115	511	68,770	435	78,875	689	167,664	1,666	109,335	1,349
Coconuts	Nos.	876,188	2,172	925,161	1,827	928,898	1,336	752,980	1,745	1,024,057	2,444	949,187	2,926
Oil cakes	Cwt.	—	—	—	—	—	—	—	—	11,955	2,124	12,828	2,849
Fruit fresh	Cwt.	4,962	1,701	6,623	2,133	7,346	1,877	7,635	2,725	—	1,911	—	1,807
Vegetables	Cwt.	90	80	175	172	127	122	313	180	264	129	158	101
Tobacco unmanufactured	Lbs.	39,455	674	32,240	366	19,275	380	43,181	684	47,650	646	27,750	316
<i>Hides and Skins.</i>													
Ox hides	Cwt.	791	961	998	1,243	790	1,058	688	775	338	465	1,186	3,135
Sheep and goat	Nos.	—	—	—	—	—	—	—	—	4,800	140	20,046	1,100
Other animals	Nos.	23,516	667	25,160	566	15,726	468	14,205	449	29,000	141	9,618	56
Mangrove bark	—	—	—	—	—	—	—	—	—	—	7,544	—	6,522
Total	...	—	637,906	—	608,354	—	554,802	—	602,112	—	787,875	—	647,838

CLOVES.

Seasonal Year (1936-37).—The crop in Zanzibar District for the seasonal year 1st July, 1936, to 30th June, 1937, was the poorest on record, the total arrivals at the Customs Dépôt being 1,578,367 lbs. equivalent to 45,096 frasilas of 35 lbs. The crop unfortunately followed upon a very poor crop for the previous year.

In Pemba the crop proved greater than was originally estimated. The harvest began in the south and centre of the island, the north producing a late (*vuli*) crop, the harvesting of which continued into February, 1937. Steady movement of the new crop to Zanzibar took place, a large quantity of old cloves also being sold out in anticipation of the alteration in internal marketing methods which became effective in August, 1937.

At the end of the seasonal year stock movement to Zanzibar was still taking place. Such crop will be included in the production of season 1937-38.

The final figures of arrivals at the Customs Dépôt for the seasonal year 1936-37 were :—

Origin.		lbs.	Frasilas of 35 lbs.
Zanzibar	...	1,578,367	45,096
Pemba	...	12,304,890	351,568
Total	...	13,883,257	396,664

Calendar Year (1937).—During the year the total supplies of cloves received by the Clove Growers Association were as shown below :—

Origin.		lbs.	Frasilas of 35 lbs.
Zanzibar	...	11,078,303	316,523
Pemba	...	22,477,919	642,226
Total	...	33,556,222	958,750

Harvesting.—In Pemba the 1937-38 harvest started in the south of the island in favourable weather, the crop was heavy and for a time picking labour plentiful. As a result of these factors and the careful inspection of cloves prior to purchase by the Clove Growers Association the condition of the crop reached a standard never previously attained in Pemba. As ripening proceeded to the centre of the island and the crop proved an exceptionally heavy one plantation owners began to raise picking prices in an erratic fashion, labour became unsettled and careless and incomplete harvesting was evident. The weather was also unfavourable during this period.

In the north of Pemba the crop was again a late one ripening taking place when harvesting in the south and centre was completed. The crop was picked in good drying weather.

In Zanzibar picking was not general until September and rain throughout the months of October, November and half of December rendered drying extremely difficult with the result that Zanzibar cloves were inferior in quality to those from Pemba, an unusual state of affairs.

Price Fixation.—The Cloves (Purchase and Exportation) Decree No. 15 of 1937 came into effect on 1st August, 1937, the effect of this Decree being to secure to the Clove Growers Association the sole right to purchase cloves within the Protectorate. Under the powers given by this Decree, the Board of Management of the Association with the advice of the Advisory Committee fixed the purchase price of cloves and clove stems at the following rates from 1st August, 1937.

PRICE IN SHILLINGS PER 100 LBS.

District.		Quality.				Clove Stems Clean.
		Good.	Fair.	Poor.	Inferior.	
Zanzibar	...	41.00	38.00	33.00	30.00	7.00
Pemba	...	40.50	37.50	32.50	29.50	6.50

The mean price paid to producers for all qualities of cloves between July 1st and December 31st, 1937, was shillings 38 and cents 58 per 100 lbs.

Exports.—The clove exports during 1937 amounted to 96,902 bales of 140 lbs. or 121,128 cwts., compared with 164,549 bales or 205,687 cwts. during 1936.

The decreased export followed upon the introduction on August 1st, 1937, of the Clove (Purchase and Exportation) Decree, since which date all cloves have been purchased by the Clove Growers Association. The Indian clove exporters who had been accustomed to handle the business of purchasing and exporting much of the crop prior to the formation of the Association have, since the passing of the above legislation, to a large extent refused to deal in cloves and as a consequence the Indian market has been practically closed to Zanzibar cloves.

The following table shows the destination of the cloves exported during the last three years.

TABLE II.

EXPORT OF CLOVES FOR PAST THREE YEARS (IN BALES OF 140 LBS).

Countries.	1935.	1936.	1937.
Dutch East Indies	... 63,859	80,451	46,856
India	... 58,731	51,221	11,699
United States of America	.. 12,546	15,542	13,539
Great Britain	... 5,566	5,303	8,739
Germany	... 1,106	2,613	8,109
Other Ports	.. 10,009	9,419	7,960
Total	... 151,817	164,549	96,902

Annual Total Production of Cloves.—In the past the figures of annual production have been based on the volume of cloves received for export at the Customs but this did not on every occasion coincide with the actual crop reaped during that year, as producers, exporters and indeed the general public were wont to gamble on a rise in prices by holding cloves—sometimes over a period of years.

Since August 1st 1937, however, with the declared policy of the Clove Growers Association to stabilize prices as far as possible in force, there has been no such incentive to anticipate a rise in prices and it is considered that future deliveries of cloves at the Association godowns will represent a very close approximation to the crop reaped in any season.

Inspection.—Inspection of cloves under the provisions of the Adulteration of Produce Decree, have, in spite of the very large crop which has been examined, proceeded smoothly.

The end of 1937 marks the completion of the twelfth year of Clove Inspection, and the second year of Copra Inspection. Since the inauguration of clove inspection steady progress has been made.

TABLE III.

EXAMINATION OF CLOVES UNDER ADULTERATION DECREE, 1937.

Origin	Total Deliveries (bags).	Passed (bags).	Failed.		
			Excess Moisture (bags).	Extraneous Matter (bags).	% Failures.
Zanzibar	... 92,783	88,007	4,533	243	5
Pemba	... 176,031	171,131	4,898	2	3

It will be seen that Pemba arrivals are almost double the number from Zanzibar Island.

The failure percentage for Zanzibar in the above Table is the result after one examination, whereas the failures for Pemba are not comparable with Zanzibar; Pemba cloves had already once passed the examination prior to shipment to Zanzibar.

During the main gathering of the harvest in Zanzibar excessive rain was experienced, which hampered the drying of cloves. Many of the shamba owners and lessees were obliged, at much expense, to transport their cloves to Makunduchi, Chwaka and places on the north road (Chaani loop) in order to hasten the drying.

A matter of interest was the use of copra kilns for clove drying. Cloves dried by this method were usually difficult to detect, as it was only by a critical examination that a faint green colour could be discerned to enable this product to be distinguished from sun dried cloves.

TABLE IV.

INSPECTION AND GRADING OF CLOVES FOR EXPORT, 1937.

Month.		Inspected and Graded. Bales*	Passed. Bales.	Failed. Bales.
January	...	21,016	20,916	100
February	...	11,709	11,709	..
March	...	6,644	6,644	...
April	...	6,324	6,269	55
May	...	1,479	1,479	...
June	...	1,543	1,543	...
July	...	2,845	2,327	518
August	...	5,653	5,653	...
September	...	5,176	5,176	...
October	...	3,925	3,925	...
November	...	9,957	9,957	...
December	...	10,680	10,680	...
Total	...	86,951	86,278	673

*Bales vary from 112 to 196 lbs. according to destination.

TABLE V.

GRADING OF CLOVES FOR EXPORT, 1937.

Special Grade. Bales.*	Grade I. Bales.	Grade II. Bales.	Grade III. Bales.	Technical Grade. Bales.
...	8,072	54,672	15,824	7,710
...	10%	63%	18%	9%

*Bales vary from 112 to 196 lbs. according to destination.

Neither this year nor last was there any Special Grade cloves exported.

Since the 17th October when the Clove Grading and Amendment Rules came into force, Grade III has been allowed to be exported for distillation purposes only.

It will be observed that a new Grade known as Technical has appeared in the Table. Exports of this grade started on the 17th October, the date of the introduction of the Clove Grading and Amendment Rules. The rules specify that the grade which contains up to 20% of clove stems is only to be used in the manufacture of vanillin.

COCONUTS.

General.—1937 was a good year for the coconut industry and although prices dropped steadily almost from the beginning of the year the average price per 100 lbs. of shillings 10 cents 62 compared very favourably with the shillings 7 cents 91 which was the average for 1936.

Gradual progress has characterised copra manufacture throughout the year and past efforts for the betterment of copra making are now bearing fruit. Producers are fully aware of the standards required under the Adulteration Decree, 1934, and it is gratifying to record that a considerable number of producers have revolutionised their former dilatory methods of manufacture.

Several new kilns have been erected this year and without question a better quality copra has been produced and the confirmation of this statement has been apparent by demands for Zanzibar copra from new overseas markets.

Weekly returns of rejected copra containing the names and addresses of all delinquents were submitted to the District Commissioner and Agricultural Officer-in-charge Kizimbani for propaganda work in the shamba.

Exports.—

TABLE VI.
COPRA EXPORTS, 1937.

Country to which exported.	Quantity in tons.
France	8,633
Italy	4,186
Holland	776
Germany	581
Great Britain	145
Aden	50
India	14
Egypt	25
Arabia	1
Total	14,411

The process average for the year is as under :—

	%
Smoke dried	52
Sun dried	25
Kiln dried	23

The gradual improvement in the quality of copra manufactured throughout the Protectorate is resulting in better returns to all sections of the trade.

OTHER CROPS.

Fruit.—An Orange Grader was installed in the Estella Market on the 11th May this year. At first the traders were reluctant to make use of this machine, but there is reason to believe that its usefulness will make a wide appeal during the next orange season (starting in May and finishing in August). Since May to July, 1937, 1,370 baskets and cases equalling 56 tons were shipped from this Protectorate. These figures do not include the victualling of ships which trade is considerable during the season.

Tobacco.—This native industry continues to grow a dark leafed tobacco of which 27,750 lbs. valued at shillings 6,320 were exported. This represents a decrease of 19,900 lbs. in quantity and shillings 6,600 in value compared with the previous year. This decrease in production is due to the large crop of cloves reaped during this year.

VETERINARY.

There are approximately 35,000 head of cattle in the Protectorate of which 25,000 are estimated to be in Pemba and 10,000 in Zanzibar. The animals are widely distributed throughout both islands principally in the hands of small owners. Herds exceeding one dozen animals only occur near Zanzibar Town where a number of dairymen keep cows to supply milk for sale in this considerable market. Sheep are not kept locally, goat flesh being a more popular source of meat with all communities except European. Goats are to be seen all over the Protectorate, the number being unknown.

Some of these dairymen own as many as 100 head of stock, the population of cattle immediately around the Town boundaries being in the neighbourhood of 1,000. The majority of the larger dairymen keep their herds on the Government plantation of Mtoni where individual paddocks for the separation of stock have been provided and a cattle dip erected. In these dairies the herds are of mixed composition containing East African types, pure Indian breeds and also crosses between European and Indian and East African breeds.

The dairymen in the Town area import good cows—principally cross-bred—from time to time but they do not normally import bulls and there is some tendency towards degeneration of stock in the large dairies.

In country areas some of the cattle owners within 15 miles of the principal towns transport their milk to the towns principally by bicycle for the purpose of retailing it, others sell it wholesale in the towns while a few sell wholesale in the country to cyclist retailers.

The year has been one of prosperity for stock owners for money has been plentiful as a result of the large clove and coconut crop and the demand for meat has been at times acute and prices good. In the table below a summary of the numbers of live stock of imported and local origin which have been slaughtered at the abattoir in Zanzibar Town is presented.

TABLE VII.
ANIMALS SLAUGHTERED AT MUNICIPAL ABATTOIR, ZANZIBAR.

	Species.	1935.	1936.	1937.
IMPORTED STOCK.	Cows	106	151	...
	Oxen	1,858	1,381	1,327
	Calves	8	10	...
	Goats	6,092	5,302	5,236
	Sheep	1,227	1,359	2,412
LOCAL STOCK.	Cows	549	581	902
	Oxen	105	218	348
	Calves	75	101	132
	Goats	4,289	3,652	2,804
	Sheep	...	...	...

During the first seven months of the year the Department was without the services of a Veterinary Officer. Fortunately there were no serious outbreaks of animal disease. The most important of the local diseases is East Coast Fever, but local cattle are highly resistant to this disease and no special precautions are necessary.

The imported cattle kept by dairymen in the town area are susceptible to the disease but compulsory dipping at five day intervals has proved to be a suitable protection.

Disease Control.—In respect of disease control the measures employed are two, the first consisting of compulsory detention in quarantine of all live stock entering the Protectorate save those which have been previously quarantined in Dar-es-Salaam and are suitably certified. This form of quarantine is a safeguard against the introduction of such epidemics as rinderpest, pleuropneumonia and tick borne diseases. Cattle are detained for 14 days and sheep and goats for 5 days. Cattle are dipped twice at three day intervals while in quarantine. Early in the year it was found that a number of local cattle were found to be suffering from Trypanosomiasis and a systematic examination of all cattle in dairies in the town area was conducted with a view to ascertaining the extent of infection and subsequently to eradicating it. As the Tsetse fly is reported not to occur in the Protectorate it is presumed that the spread of infection is only possible by direct transmission of the parasite by biting flies. Under such circumstances it was considered that in the dairies at Mtoni where some 800 head of cattle are congregated it might be possible to eradicate the disease by the slaughter of infected animals of little value or by treatment of animals which were valuable.

An examination of blood smears from all animals at the dairies revealed that the incidence of Trypanosomiasis was approximately 1% of the total stock, and by the voluntary collaboration of the dairymen the infected animals were slaughtered. Further tests will be made.

Animal Husbandry.—Animal husbandry in the Protectorate may almost be said to be non-existent except in the neighbourhood of Zanzibar Town. In country areas the natural grazing of cattle is generally all that they receive although a little additional grass may be given while animals are tethered. Overstocking, however, is not an acute problem in Zanzibar and even in the height of the dry season mature animals remain in fresh condition.

A start was made during the year, again amongst the town dairymen, who are the most receptive stockowners with the voluntary castration of superfluous and undesirable types of bull calves.

Proposals which were submitted to Government and have been approved provide for the importation of a Montgomery bull and two cows from India during 1938.

The Protectorate imports a large proportion of its meat supply and the businesses of cattle importer and butcher are combined in the hands of a few persons. During the year one of them was persuaded to hire premises for the shade drying of cattle hides and goat skins, a development which it is hoped will spread.

No facilities for comprehensive veterinary education exist in the Protectorate but two pupils, who have completed approximately two years training in agriculture at the Department's experiment station, have been seconded to the Veterinary Officer for such a course of systematic training as will enable them to be of considerable utility locally for work at the quarantine station, abattoir and amongst stock owners.

SECTION II.

WORK OF THE DEPARTMENT OF AGRICULTURE.

GENERAL.

Agricultural Education.—The educational work of the Department was seriously handicapped during the year by shortage of staff,—indeed for a considerable period of the year the staff consisted of the Acting Director, the Silviculturist and two Agricultural Officers, one of whom was stationed in Pemba.

Whenever either the Manager of Plantations or the Inspector of Produce are on leave, which happens during sixteen months in every three years, it is necessary for him to be relieved by an Agricultural Officer which for all practical purposes results, apart from the head of the Department, in only two technical officers being permanently available for Zanzibar and one for Pemba.

Under such circumstances progress in agricultural education has, of necessity been slow, and in the main has been directed to the improvement of copra production.

During the year the pupils who, it is proposed, shall from the subordinate field staff of the Department carried on with the second year's work of their course of instruction at Kizimbani. The majority of these youths are proving excellent material and in the course of time should enable the Department to extend its activities more fully towards the small holding section of the population.

EXPERIMENTAL WORK.

The year 1937 constituted the fifth full working year of the Station. The policy was unchanged and was in general a continuation of the work of previous years.

An important feature during the year was the reduction of the size of the estate. This was effected by handing over to the Plantation Section the areas known as Kidichi and Nguruweni which lie west of the Princess Marie Louise Road.

CLOVES.

Nursery Work.—Following routine practice clove seedlings were again issued to the public this year.

The seedlings were from selected fallen seed of selected parents, germinated under nursery conditions and hardened off in banana-leaf pots prior to distribution. The popular demand for an increased issue of clove seedlings has necessitated the decentralization of this work and before the end of the year five nurseries were under construction.

In 1937 clove seedlings were issued as follows:—

Zanzibar	...	39,128
Pemba	...	20,179
Total	...	59,307

Uniformity Trial.—The last of the four Uniformity Blocks of this trial was planted in the *Masika* rains. The seed was from four parents and sown between rows of *Tephrosia candida*. The 1934, 1935 and 1936 blocks received routine maintenance and the usual height and girth measurements were taken in June. *Tephrosia* was removed from these three older blocks.

The heavy damage by white ants which was described in the Annual Report of last year was again experienced and the doubt previously felt as to the value of the block for statistical purposes has been confirmed, but the experience obtained in this Uniformity Trial has been used in preparing a new trial, the earlier errors of too complex a lay-out and too early planting after clear felling being thus avoided.

The site of this new trial has been under food crops for several years, and is free from white ants. It has been ploughed, harrowed, ridged and sown to *Calopogonium* cover. A belt of shade trees (*Cassia siamea*) have been planted on its three unprotected sides and the lay-out will be decided upon after advice has been received from Rothamsted Experiment Station in England as to the optimum plot size for clove experimentation.

Yield Plots and Indicator Plots.—The recording of the yield of groups of individual trees of different age classes scattered throughout the Zanzibar clove areas was continued as during previous years. The harvesting of these plots, owing to the large crop, presented many labour difficulties.

The records of these plots for the previous years were analysed and formed the basis of calculation for the assessment of the value of clove trees in the recently introduced Debt Redemption Legislation.

As a result of the analyses of these yield records, it was considered that yield records of the old mature stands over wider areas, especially in bumper crop years, should be obtained, so that records should be available for typical mature stands, such as the Mkokotoni area, and that figures of yield should be obtainable of the poorer types of trees which are not uncommonly found on the periphery of the clove areas.

As a result of these considerations, six more plots consisting of 225 trees were laid down and recorded.

A similar series of indicator plots were laid down in Pemba by the Silviculturist and Agricultural Officer-in-charge. The series consisted of 539 trees arranged in 16 plots and were recorded by the Agricultural Officer, Pemba.

Harvesting was completed on most plots in December.

Regeneration of Old Clove Stands by Cultural Treatment.—This experiment was originally laid down in 1932 to obtain data on the possibility of rejuvenating old clove stands by different cultural treatments and during the year the treatments were applied according to schedule and all plots were individually harvested.

Although surprisingly good yields were maintained for such poor canopied trees, it is obvious that the trees are not responding to the treatments, and although the full analysis of the available figures is not yet available, it is probable that they are beyond repair, and that uncontrolled picking in a medium crop year would result in their complete destruction.

The inability of the trees to make canopy was noted in 1935, and a scheme was formulated to interplant young seedlings at 28' triangular in the shade of the existing trees. The planting was undertaken in 1936 and they now present a very pleasing sight. The protection afforded by these trees appear ideal for the successful establishment of young clove seedlings.

The treatments are being continued, and the indications are that the experiment will resolve itself into an establishment trial of seedlings under varying cultural treatments.

Pollination Experiments.—In 1936 a technique was evolved in which clove inflorescences were bagged in order to ensure self-pollination, but no fertile seeds were obtained and last year a larger trial was made, which is still in progress.

On three trees many inflorescences were bagged and the fruit collected but by the end of the year only two fertile seeds had been obtained.

The technique was altered by reducing the dimension of the three trees by removal of the upper half. All inflorescences were then bagged and later developed inflorescences were removed. When fertilization was completed the cylinders were removed and a large space clean-weeded around the trees. All fallen seed thereafter was considered self-fertilized, but by the end of the year no viable seed had yet been obtained.

It is possible that the enclosures of the inflorescences in a cellophane cylinder causes very unnatural humid conditions liable to cause early abscission of the fruit or abnormal development. It does, however, appear that the clove can be self-fertilized and produce viable seed, but the bagging technique will require modification if large numbers of self-fertilized seed are required.

Clove Chafer.—Further specimens of this insect have been found near the roots of recently ring-barked clove seedlings and sent to various authorities for identification, and the three different names obtained for specimens submitted in 1936 have been augmented in 1937 by a further identification.

It appears probable that several similar species are present in association with the clove. It is not possible at present to determine if one or all of these is responsible for root damage, or at what stage of the insect's life history attack occurs.

Ants: "Maji-ya-moto" (Oecophylla Smaragdina).—It was shown in 1936 that a grease band around the bole of the tree plus "Capex" liquid poison cleared the tree effectively in two to three months and this year it was confirmed that the grease banding alone had no effect on the infestation of the tree by the ants.

Trials of different insecticides were made including Messrs. Cooper's "Derisol" and a "Pyrethrum" compound retailed locally. This method quickly clears the tree but re-infestation takes place after a few hours. It was also found that when a large number of pickers were present, the use of the spraying apparatus caused nearly all the pickers to cease work in order that their trees might be treated, whereas if no spraying was done at all, most of them would pick without undue discomfort or cessation of work. The use of healing oil of Messrs. Cooper's was also investigated. This is spread on the limbs of pickers who, afterwards, do not feel the intense stings of the insect and later appear to be unattacked. The use of this oil appears quick, efficient and profitable.

"Sudden Death" Investigations.—The monthly observations of the incidence of this disease of mature trees and its prognosis in the 800 tree block was continued.

The year's records confirm the previous results in that a serious disease exists in the clove tree population of the Protectorate.

Records of mortality on this block are now available from September, 1934, and can be summarized as follows:—

Number of deaths up to December, 1935	=	83
" " during 1936	=	136
" " " 1937	=	79

Omitting the 1935 figures it can be calculated that in 1936, 136 trees out of the total population under review died, which gives a percentage mortality of 19%, and in 1937 of 13%, giving a mean for the two year period of 16%.

This expressed in practical terms of farming means that a producer might within seven years lose his entire capital, and be without a source of income for a long period.

Six hundred Tree Yield Plot at Kizimbani (K.B.C.).—For the fifth successive year the trees of this block have been harvested individually. Replacements have been made and measured. The block was cross-ridged before the short rains to counteract soil erosion.

The advent of a bumper clove crop necessitated careful organization for picking the 600 individual trees in the block, and picking commenced in June and continued, with respite only on odd days, until the end of the year. It is anticipated that picking will end in January, 1938.

Over a hundred pickers were employed daily in this block during the flush period being augmented with labour from the Victoria Gardens and from Machui.

The harvest was aided by the use of "Pyrethrum" sprays and "Coopers" healing oil in trees infested with *Maji-ya-moto* ants.

COCONUTS.

Seed Collection.—The study of the 300 palms referred to in previous reports was continued. The final fall of nuts during the year completed three full years of records.

This study was commenced in January, 1935, with the selection of the 300 best palms available in a population of 43,000 palms. It was considered that this was a large enough sample and representative of the palm population of Zanzibar. The selection was made by traversing the estate and selecting the palms which exhibited desirable characters which were considered to be:—

- (a) Large numbers of visible nuts evenly distributed around the crown.
- (b) Large numbers of visible immature nuts, buttons and flowering spathes evenly distributed around the crown.
- (c) Short flower stalks.
- (d) Wide open crowns with evenly distributed fronds.

Consideration was also given to the following factors:—

- (a) Absence of immature nut-fall.
- (b) Freedom from "Gummosis".
- (c) Previous history (if available).

The assistance of professional coconut palm climbers was enlisted and proved to be of considerable help as they were familiar with most of the palms on the plantations and possessed in a general sort of way a mental record of their past behaviour. They invariably confirmed a selection by their previous knowledge of the palms.

On the completion of the selection, arrangements were made to visit each palm four times in a year at three monthly intervals and collect the ripe nuts. The nuts from each palm were stored separately in numbered wire pens.

After each gathering the data for each palm's produce was described as follows:—

- (a) Number of nuts.
- (b) Weight of nuts.
- (c) Description of nuts.
- (d) Weight of husked nuts.
- (e) Description of husked nuts.
- (f) Description of yield of copra.
- (g) Incidence of gummosis.
- (h) Individual oil content.

The results of the work performed up to the present show that palm yields per annum vary from 197 to 30, with an annual average of 92 nuts per palm and the selected trees compare very favourably with the Zanzibar average which is calculated as 35 nuts per palm.

Some 135 palms were reserved as a seed reservoir for issue to growers locally.

Kapok.—The Java importations, which were planted to the field in 1936, are making excellent progress, and the crop promises well for local conditions.

A further collection, consisting of three varieties, were imported and planted in the Nursery. They have made good progress and will be planted out in separate blocks in the *Masika* 1938.

Spices.—The imported Malayan areca nut palms continue to thrive.

The imported pepper vines survive, but make little progress under local conditions.

A few vanilla vines were established in the Spice Block for educational purposes.

Essential Oils.—Half-acre plots of the following were maintained :—

- (a) *Cinnamomum zeylanicum*.
- (b) *Citrus bigaradia* (local).
- (c) *Cananga odorata*.
- (d) *Vetiveria zizanoides* (Java origin).
- (e) " " " " " (Reunion *via* Uganda).
- (f) *Cymbopogon citratus*.
- (g) *Cymbopogon martini*.
- (h) *Cymbopogon nardus*.
- (i) *Citrus bigaradia* (Madagascar origin).

Cover and Green Manuring Crops.—Observations of the following cover crops has led to the following conclusions during the year :—

Tephrosia candida.—This crop appears to be of value as a nurse crop for clove seedlings for the first year. After this, it is valueless as a nurse crop, but makes a useful wind break.

Mucuna utilis continues to be the best short-term cover and an excellent green manure.

Calopogonium mucunoides suggests that it is one of the best long-term covers yet established. It regenerates readily after harrowing.

Centrosema pubescens is unsuitable for Zanzibar conditions.

Pueraria javanica gave an excellent cover from cuttings in the damp soil of the Mlangoni valley. On drier land, is very difficult to establish, and its early promise of being a good long-term cover on clove and coconut land has not been maintained.

Popondo bean seed sown under maize this year produced a magnificent cover by spreading on the ground and scrambling up the old maize stalks.

As it produces edible beans, its use may become more widespread. At the present time great promise is shown by this crop.

ANNUAL CROPS.

Maize.—Small quantities of three varieties of yellow maize, i.e. :—

- (1) Sahara
- (2) Eksteen
- (3) Peruvian

were received from South Africa. A greater quantity of seed is now available for more detailed observation in 1938. The introduction of yellow maize results from a popular belief in its superior dietetic qualities.

Rice.—The seven best local varieties were grown together with four Malayan and one Kenya imported varieties.

As far as can be estimated, the yields of the better varieties lie between 3,500-4,000 lbs. per acre and the palatability is recorded as being good.

The Malayan varieties matured very slowly with fair yields, and the Kenya variety was excellent in yield and quality. Two Malayan varieties germinated poorly and only produced a few lbs. of seed which will be re-sown in 1938. Of the other varieties the more promising will be represented in a variety trial in 1938.

Rice is one of the most important food crops of the Protectorate and the production of a high yielding, palatable variety is of great importance.

Cassava.—Further progress has been made with the trials for yield and resistance to virus disease on local and imported varieties.

Of the 50 varieties harvested last year, 24 were re-planted and recorded for yield, disease resistance and palatability. The eight best varieties have been planted in a large scale variety trial.

It was shown last year that a system of rogueing cassava plots during the first few months of the crop and replacing the rogued plants by clean cuttings, had no significant effect on yield and this work was repeated in 1937.

Results bear out last year experiment (rogueing treatment 8,254 lbs. per acre; control 8,316 lbs. per acre).

Poultry Rations.—The standard station ration includes dried shark as its protein constituent. As this commodity is expensive and also a human food-

stuff, a simple trial was made to compare with it a ration of similar protein richness but of vegetative origin (*Vigna cati*ang).

After six months it was clear that those birds under the vegetable protein ration were yielding considerably less eggs than those on animal protein ration, and clearly showed the greater efficiency of the latter. Thus :—

TABLE SHOWING EGG YIELDS FOR SIX MONTHS FROM HENS FED ON VEGETABLE PROTEIN RATION (COWPEAS) AND ON AN ANIMAL PROTEIN RATION (SHARK).

Month.		Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6
		Shark.	Shark.	Shark.	Cowpea.	Cowpea.	Cowpea.
May	...	118	97	108	92	63	67
June	...	95	63	81	49	50	44
July	...	120	80	87	84	58	71
August	...	118	137	91	70	58	47
September	...	110	97	74	94	46	59
October	...	102	76	103	37	40	35
Total	...	663	550	544	426	315	323
Egg per bird per month	...	13.8	11.4	11.3	8.9	6.6	6.7

DEBT SETTLEMENT WORK.

A considerable amount of time was spent by several officers of the Department in work connected with the Debt Settlement Scheme. This included the preparation of the valuation schedules for clove and coconut trees for the Debts Settlement Bill, the careful check of these schedules by applying them to a number of plantations the value of which was known on account of their having been sold in the open market within recent years, and the collection of accurate data relating to the yield of clove trees of different ages and on different soils.

Information as to the yield of clove trees was obtained from a number of yield plots situated in various parts of the two islands. The trees on these plots numbering some 985 were all individually classified according to their canopies and their harvest performances recorded. It is, therefore, now possible to correlate clove tree vigour as expressed by height, girth and canopy measurements with actual yield.

GOVERNMENT PLANTATIONS.

The report of the Manager of Plantations (Appendix V) shows that the excess of receipts over expenditure from the principal plantations during the year amounted to more than £3,400 and over the five year period 1933-37 to approximately £5,000.

The continued farming of large blocks of land by a Government Department can only be justified if the different plantations are being employed to demonstrate good cultural methods or in the large scale investigation of problems calling for solution and it is considered that otherwise the management of these plantations is a drain upon the technical and other resources of the Department and it is hoped that in the near future the majority of the Government plantations may be disposed of so that full activities of the Department may be devoted to the investigation of the various problems which confront producers and to the agricultural education of the people.

OTHER WORK OF THE DEPARTMENT.

Chemical Investigations.—The samples submitted for chemical analyses exhibited their usual diversification and the Government Chemist's report is attached as Appendix VI.

Public Gardens.—The public gardens, open spaces and roadside avenues in the town area were maintained in good condition and the Silver Jubilee Memorial Gardens were completed. The Superintendent of Gardens gave regular instruction in Botany to the pupils at the experiment station.

Publications.—The following publications were made during the year :—

Publication No. 1 of 1937. The Clove Plant, *Eugenia Aromatica*, L. Nursery Practice and Estate Planting. By L. G. T. Wigg.

The Production of Compost at Kizimbani Experiment Station, Zanzibar, published in the East African Agricultural Journal. By G. E. Tidbury.

SECTION III.

FINANCIAL STATEMENT.

The expenditure and revenue of the Department are summarized below, expenditure having been increased by over 48,000 shillings compared with the previous year, and revenue by approximately 1,12,000 shillings. The greater part of the increase in revenue was due to a bumper clove crop, receipts from sales of cloves being some 1,10,000 shillings more than in the previous year.

EXPENDITURE.			
Item.		Amount.	
		Sbs.	Cts.
Personal Emoluments	...	263,344	45
Other Charges	...	260,052	87
Special	...	13,989	68
Total	...	537,387	00

REVENUE.			
Item.		Amount.	
		Sbs.	Cts.
Sale of Cloves	...	138,070	35
Sale of Copra and Coconuts	...	151,703	28
Produce Inspection Fees	...	9,176	80
Miscellaneous	...	7,480	23
Total	...	306,430	66

Portions of the Government Plantations in Zanzibar and Pemba were disposed of during the year, the value of sales in Zanzibar being 4,700 shillings and in Pemba 98,100 shillings.

SECTION IV.

LEGISLATIVE CHANGES AFFECTING AGRICULTURAL INDUSTRIES.

During the year unprecedented volume of agricultural Legislation was enacted, as noted below :—

Reference No.	Title.	Date of Introduction.
1. Decree No. 7 of 1937	... The Diseases of Animals (Validation of Fees) Decree	10th June, 1937
2. Decree No. 9 of 1937	... The Plant Protection Decree	10th June, 1937
3. Government Notice No. 19	... The Diseases of Animals (Amendment) Rules, 1937	18th May, 1937
4. Decree No. 15 of 1937	... The Clove (Purchase and Exportation) Decree	1st August, 1937
5. Decree No. 13 of 1937	... The Agricultural Produce Decree, 1937	1st August, 1937
6. Government Notice No. 31	... The Agricultural Produce Rules, 1937	1st August, 1937
7. General Notice No. 665	... General Notice under C.G.A. Decree (Cap. 118)	1st August, 1937
8. Government Notice No. 36	... The Prevention of Cruelty to Animals (Veterinary Hospitals) Order, 1937	4th August, 1937
9. Government Notice No. 39	... The Clove Grading and Export (Amendment) Rules, 1937	24th August, 1937
10. Government Notice No. 45	... The Clove Grading and Export (Amendment) Rules, 1937	17th October, 1937
11. Government Notice No. 51	... The Agricultural Produce (Amendment) Rules, 1937	26th October, 1937
12. Government Notice No. 55	... The Public Health (Control of Oxen) (Amendment) Rules, 1937	17th November, 1937
13. Decree No. 23 of 1937	... The Adulteration of Produce (Amendment) Decree	10th December, 1937

The Diseases of Animals (Validation of Fees) Decree.—This legislation was made to regularize the collection of certain fees for inspection of cattle which had been collected without legal authority.

The Plant Protection Decree.—This Decree was passed as a result of the recommendation of the Conference of East African Governors and was designed to give powers for the control of plant pests and diseases similar to those in the neighbouring Mainland colonies.

The Diseases of Animals (Amendment) Rules, 1937.—By Government Notice No. 19 these Rules made under Section 20 of the Diseases of Animals Decree (Cap. 128) provided for the importation of cattle without the necessity for quarantine if certain prior conditions had been complied with, and laid down the scale of fees for the veterinary inspection of imported animals.

The Clove (Purchase and Exportation) Decree.—The most important and, certainly, the most controversial piece of legislation affecting agriculture enacted during the year was the Clove (Purchase and Exportation) Decree. The effects of this Decree were, firstly, to place the Clove Growers Association in the position of being the sole purchaser of cloves within the Protectorate and, secondly, to give the same body the sole right to sell cloves destined for export, although powers exist to authorize persons, under licence, to purchase cloves within the Protectorate and to deliver them to a carrier for conveyance beyond the limits of the Protectorate.

The Agricultural Produce Decree and Rules.—The Agricultural Produce Decree, No. 13 of 1937, is concerned with the regulation and control of dealings in agricultural produce and is at present restricted in its application to coconuts and copra, although power exists to bring other produce within the scope of the Decree by notice in the *Official Gazette*. The Decree and Rules made thereunder have been introduced in an endeavour to reduce widespread theft of coconuts. A dealer requires to be licensed under this Decree which makes it an offence for coconuts or copra to be moved without the limits of a person's property unless covered by a permit which must be retained in possession of the person in charge of the produce and presented for examination at such points as are prescribed. Produce may only be moved between the hours of sunset and sunrise on prescribed roads. The Agricultural Produce Rules, 1937, made under the Decree prescribe forms of licences and permits and conditions as to their use.

General Notice under the Clove Growers Association Decree (Cap. 118).—By General Notice No. 665 of 3rd August, 1937, under sub-section (1) of section 13A of the Clove Growers Association Decree, the Board fixed clove prices as follows for the seasonal year 1937-38 :—

		Zanzibar	Pemba
		District.	District.
		Per 100 lbs.	Per 100 lbs.
		Shs. Cts.	Shs. Cts.
Good quality	...	41 00	40 50
Fair quality	...	38 00	37 50
Poor quality	...	33 00	32 50
Inferior quality	...	30 00	29 50
Clove Stems	...	7 00	6 50

The Prevention of Cruelty to Animals (Veterinary Hospitals) Order, 1937.—By Government Notice No. 36 this Order established a Veterinary Hospital under section 7 (1) and (3) of the Prevention of Cruelty to Animals Decree (Cap. 127) and prescribed fees for feeding and treatment of animals seized under the authority of the Decree.

The Clove Grading and Export (Amendment) Rules, 1937.—These Rules made under the Agricultural Produce Export Decree (Cap. 116) provide for the collection of inspection, grading and branding fees for produce on demand.

The Clove Grading and Export (Amendment) Rules, 1937.—Made under section 5 of the Agricultural Produce Export Decree (Cap. 116), these Rules provide for the preparation of an additional grade of cloves to be known as Technical Grade described as under :—

Technical Grade : Either

- (a) Cloves which contain not more than—
 - 5% of mother of cloves and foreign superfluous or inferior matter
 - 80% of khoker cloves
 - 20% of stems
 - 16% of moisture, or
- (b) the clean dried inflorescence of the clove tree (that is to say commercial clove stems from which the buds have not been removed) containing not more than 5% of mother of cloves, and foreign superfluous or inferior matter and 16% of moisture.

The Rules provide also that Technical Grade of cloves shall be exported for use in the manufacture of vanillin only and that Grade III cloves shall be exported for distillation only. The object of the creation of Technical Grade cloves is to provide manufacturers of vanillin with a source of raw materials for the manufacture of vanillin at a price competitive with synthetic substitutes and the proviso regarding the restriction on the sale of Grade III cloves is intended to prevent inferior cloves being placed on the spice market.

The Agricultural Produce Amendment Rules, 1937.—By Government Notice No. 51 under section 13 of the Agricultural Produce Decree (No. 13 of 1937) an additional post for the inspection of permits covering produce in transit was created.

The Public Health (Control of Oxen) (Amendment) Rules, 1937.—Under the Public Health Decree (Cap. 60), the Rules provide for the prevention of cattle keeping within the limits of Towns but permit grazing of cattle during the hours of daylight with such limits under permit from the Medical Officer of Health. Those dairymen who previously kept cows within the limits of Zanzibar town have now been provided with a site in the Government Plantation of Mtoni.

R. W. R. MILLER,
Director of Agriculture.

APPENDIX I.

METEOROLOGICAL OBSERVATIONS, 1937.

Rainfall and Relative Humidity, Zanzibar.

		Clove Growing Areas.										Non Clove Growing Areas.									
		Dunga		Kidichi		Kizimbanii		Machui		Salem		Chukwani		Chwaka		Makunduchi		Mkokotoni		Zanzibar Town	
Months		Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days
		Average Relative Humidity %		Average Relative Humidity %		Average Relative Humidity %		Average Relative Humidity %		Average Relative Humidity %		Average Relative Humidity %		Average Relative Humidity %		Average Relative Humidity %		Average Relative Humidity %		Average Relative Humidity %	
January	1.28	6	0.02	1	0.04	2	76	0.35	4	0.45	1	0.44	5	81	0.32	1	0.00	0	0.03	1	0.09
February	0.96	6	1.20	3	0.34	3	77	0.62	5	2.70	3	0.46	5	79	0.18	1	0.35	1	0.31	1	0.99
March	11.64	15	14.05	13	12.58	12	80	13.27	12	11.09	16	8.59	16	82	11.62	10	7.31	10	9.36	6	9.54
April	16.20	22	14.72	22	14.67	23	88	13.10	23	15.10	26	14.01	25	90	25.03	20	9.06	20	13.37	15	15.24
May	11.90	18	8.32	21	7.59	15	85	9.92	18	8.35	17	7.31	15	89	9.97	8	4.57	8	10.71	15	7.53
June	0.70	9	0.74	5	1.36	5	85	1.25	3	1.21	6	0.46	3	88	0.97	5	0.76	3	0.96	2	0.74
July	0.15	4	0.33	4	0.08	1	79	0.06	1	0.30	6	0.15	3	84	0.60	2	0.00	0	0.68	4	0.14
August	2.55	13	2.43	10	3.79	9	83	2.56	11	3.18	10	2.06	7	87	1.22	4	0.88	2	5.39	9	2.77
September	4.29	18	5.51	23	4.84	22	81	4.59	21	3.82	25	0.78	12	88	1.33	7	0.76	3	3.68	14	2.11
October	7.25	17	7.26	15	6.26	15	79	6.22	16	7.02	17	4.50	12	84	3.63	6	1.66	6	4.98	13	6.64
November	10.91	20	14.16	19	11.85	17	80	12.06	19	11.78	14	10.11	15	85	2.55	5	1.80	7	5.80	9	6.45
December	8.77	13	7.94	13	8.62	12	81	12.38	14	6.38	17	4.14	11	85	2.97	6	1.73	9	4.55	8	8.18
Total 1937	76.60	161	76.68	149	72.02	136	81	76.38	147	71.38	158	53.21	129	85	60.42	88	28.38	69	60.02	97	60.42
Total 1936	85.00	154	74.45	165	83.88	144	82	81.68	154	72.91	137	59.21	133	85	72.45	101	39.86	109	+	94	77.15

Note:— Rainfall in inches + Records doubtful

APPENDIX II.

METEOROLOGICAL OBSERVATIONS, 1937.

Rainfall and Relative Humidity, Pemba.

Clove Areas												
Months	Kigomacha		Matangaiwani		Mkoani		Mtambili		Wesha		Wete	
	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Average Relative Humidity %	Wet Days
January	0.00	0	0.05	2	0.72	9	3.84	12	0.47	5	73	0.69
February	0.69	4	2.73	7	1.51	4	3.25	9	1.25	6	70	1.80
March	12.56	10	10.97	11	9.59	10	10.16	12	12.73	11	76	13.71
April	13.88	18	15.97	24	21.58	21	24.68	27	18.20	22	83	14.35
May	24.91	24	19.97	29	24.41	21	27.48	26	21.67	23	83	22.83
June	3.21	6	2.73	18	2.20	10	3.38	14	1.95	8	77	2.03
July	1.28	6	1.64	15	0.54	7	1.29	8	1.04	7	79	1.12
August	1.30	5	2.49	16	1.48	10	2.89	14	1.83	9	77	1.88
September	3.35	12	1.59	12	1.03	8	1.24	14	0.76	7	80	1.89
October	10.99	16	6.97	12	6.17	9	5.20	14	4.33	9	84	4.85
November	3.67	9	8.60	18	8.55	15	6.05	16	6.68	14	81	5.72
December	6.12	7	3.59	16	9.98	14	8.83	18	5.31	12	78	6.09
Total 1937 ...	81.96	117	77.30	180	87.76	138	98.29	184	76.22	133	78	76.36
Total 1936 ...	107.53	125	+	+	93.00	154	129.38	213	100.59	149	78	106.14

Note:—Rainfall in inches. + No records.

APPENDIX III.

METEOROLOGICAL OBSERVATIONS, 1937.

Temperatures.

Months	ZANZIBAR.					PEMBA.				
	Clove Areas			Non Clove Areas			Clove Areas			
	Dunga		Kizimbani	Chukwani		Zanzibar Town	Wesha			
	Mean Max.	Mean Min.	Mean Max.	Mean Min.	Mean Max.	Mean Min.	Mean Max.	Mean Min.		
January	89.7	74.5	87.8	74.4	89.6	76.3	90.3	77.1	91.3	74.7
February	91.3	74.0	89.2	74.3	92.7	77.2	91.7	77.1	92.3	75.3
March	88.8	73.1	87.6	73.5	90.4	76.5	89.4	77.0	91.3	75.3
April	86.4	73.5	83.7	73.1	84.6	75.5	86.0	75.7	85.6	74.5
May	85.1	72.0	83.4	72.5	82.7	75.6	84.8	76.0	82.4	73.6
June	85.8	68.0	83.2	69.6	82.9	74.3	84.6	73.7	82.3	71.3
July	85.1	67.4	81.7	68.1	81.6	72.7	83.4	72.6	81.0	71.4
August	84.2	66.1	81.5	68.0	81.5	72.0	82.8	71.4	82.5	70.3
September	84.4	65.9	81.5	67.8	83.8	72.4	84.0	70.5	87.1	71.0
October	88.0	68.1	82.4	69.6	84.7	73.4	85.6	72.3	88.8	73.4
November	87.9	69.3	84.9	71.1	88.1	74.8	86.3	74.3	88.3	74.5
December	88.5	72.6	86.0	72.4	87.2	75.5	87.9	75.7	88.1	74.6
For the Year ...	87.1	70.4	84.4	71.2	85.8	74.7	86.4	74.5	86.7	73.3

Note:—Temperatures in Degrees Fahrenheit.

APPENDIX IV.

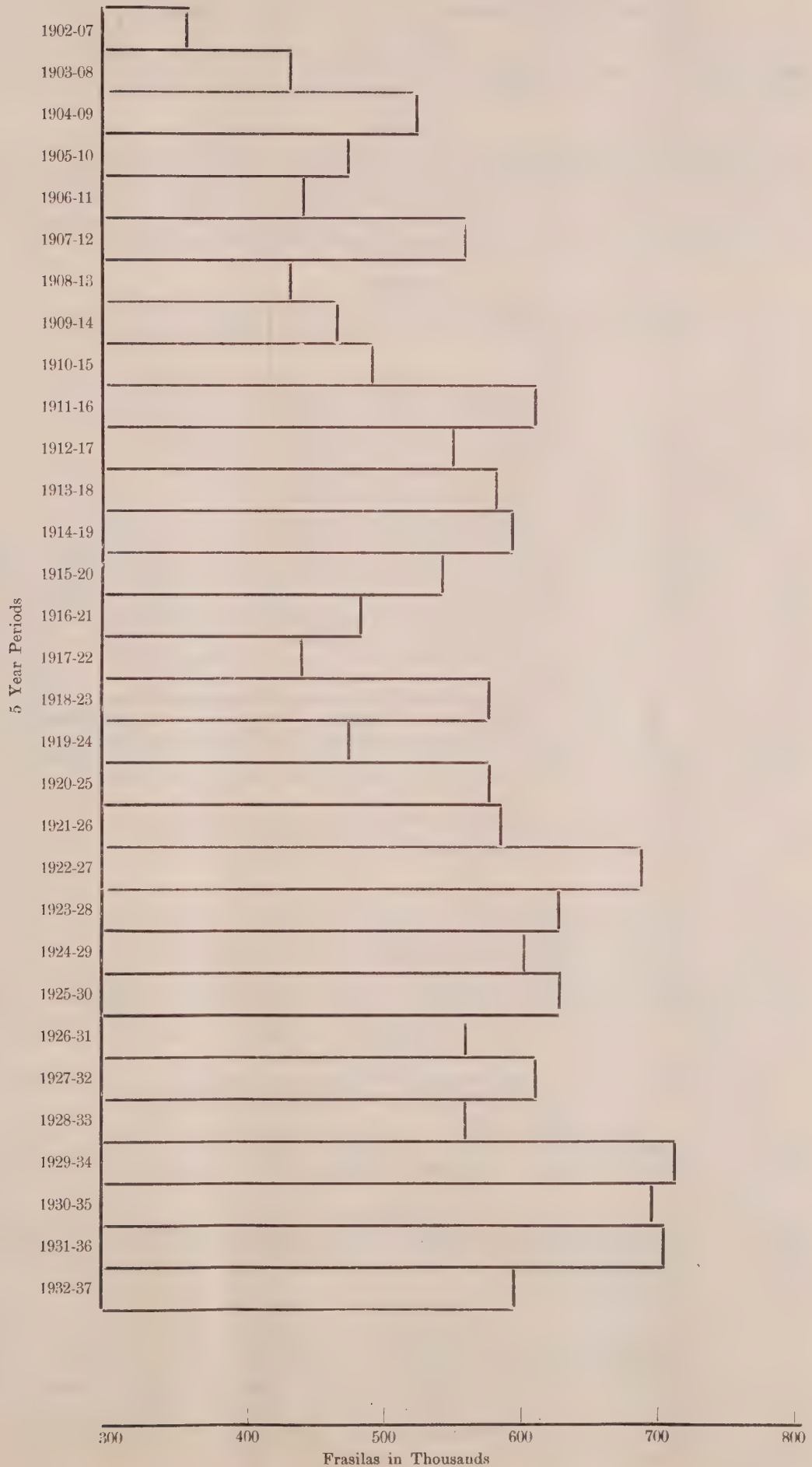
Approximate Production of Cloves in Frasilas of 35 lbs. for 35 Crop Years.
(1st July to 30th June).

(Based on receipts of cloves at the Customs Clove Depôt).

Season	Zanzibar	Pemba	Total	Mean Crop per season in five year periods Fras.
	Fras.	Fras.	Fras.	
1902/03	172,000	252,000	424,000	—
1903/04	27,000	99,000	126,000	—
1904/05	81,000	654,000	735,000	—
1905/06	178,435	129,735	308,170	—
1906/07	63,004	203,496	266,500	372,000
1907/08	213,662	541,993	755,655	438,000
1908/09	165,727	449,691	615,418	536,000
1909/10	109,678	300,047	409,725	471,000
1910/11	52,100	139,307	191,407	448,000
1911/12	216,507	582,153	798,660	554,000
1912/13	31,018	104,368	135,386	430,000
1913/14	145,586	638,094	783,680	464,000
1914/15	194,920	331,389	526,309	487,000
1915/16	141,641	655,116	796,757	608,000
1916/17	208,716	302,919	511,635	551,000
1917/18	63,958	234,239	298,197	583,000
1918/19	259,273	565,229	824,502	591,000
1919/20	93,847	168,703	262,550	539,000
1920/21	231,831	316,446	548,277	489,000
1921/22	65,819	200,983	266,802	440,000
1922/23	291,417	690,498	981,915	577,000
1923/24	75,027	236,767	311,794	474,000
1924/25	240,952	520,490	761,442	574,000
1925/26	219,192	392,622	611,814	587,000
1926/27	203,843	529,186	733,029	680,000
1927/28	190,370	500,382	690,752	622,000
1928/29	74,828	125,740	200,568	600,000
1929/30	318,647	610,296	928,943	633,000
1930/31	51,796	201,320	253,116	561,000
1931/32	175,070	760,786	935,856	602,000
1932/33	242,772	244,594	487,366	561,000
1933/34	146,098	781,090	927,188	706,000
1934/35	360,037	503,415	863,452	693,000
1935/36	65,938	232,571	298,509	702,000
1936/37	45,096	351,568	396,664	595,000
Average for 35 Seasons	154,766	387,149	541,915	

APPENDIX IV A.

Graph Showing Average Clove Crops per Seasonal Year in 5 Year Periods.



APPENDIX V.

Report of the Manager of Government Plantations.

The Government Plantations in Zanzibar, at the beginning of the year, extended to approximately 7,266 acres containing 54,337 clove and 133,388 coconut trees. The increase from last year is due to the transfer of 1,200 acres of the Kizimbani Experimental Estate to the Plantation Section.

There has been only one sale of land during the year. This consisted of a plot of 20 acres at Miwani which carried 361 clove and 334 coconut trees. The Chuini group of plantations, comprising 730 acres of land carrying 6,300 coconut trees, has been leased for 30 years with a stipulation in the agreement that an area of 10 acres should be planted to coconuts each year.

Government Plantations in Pemba, which consist chiefly of coconut trees in Town areas, are not considered in this report as they are controlled by the Agricultural Officer, Pemba.

CLOVES.

Harvesting.—All the 1936/37 season's crop was picked and sold in 1936 and was reported on last year. This report only deals with that part of the 1937/38 season's crop which was harvested in 1937.

Owing to the failure of the crops in the past two seasons it was anticipated that this season's crop was likely to be a large and early one which would probably be finished before the end of the year. Actually the harvest was at its height at the end of the period under review. Light pickings started in the month of June and continued till the end of September when the harvestings became heavy. Cloves picked during the calendar year amounted, when dry, to 8,372 frasilas (293,043 lbs.) as compared with crops of 306, 933 and 13,193 frasilas for the full seasons of 1936/37, 1935/36 and 1934/35 respectively.

During the height of the harvest the supply of pickers did not meet the demand with the result that many buds burst into flower before they could be picked. Consequently a considerable proportion of the crop was lost. The fast of *Ramadhan*, coming when many of the trees were in full flush of buds, also interfered with production. During one fortnight, the flush of ripe cloves was so heavy in the Government Plantation of Machui, which carries 22,000 clove trees, that there was work for 1,000 pickers. Unfortunately, the number available never exceeded 194. Many neighbours inflated the picking price to 25 cents per pishi (4 lbs.) of green cloves to attract labour but they also missed some of their crop. On Government Plantations the rate paid to pickers was 10 cents per pishi of green cloves up till the end of October. During November and December 13 and 15 cents per pishi were paid respectively. The rate paid in December was warranted as the revenue from Government Plantations for the first eleven months of the year exceeded the expenditure, including Headquarters charges for the year but excluding clove harvest expenses for December, for the whole year. The quantity picked during December was 31% of the total amount picked.

During the first three months of the harvest and the last fortnight of the year, drying conditions were good. Between the end of September and middle of December, 42.5% of the year's rainfall was recorded, and drying operations were difficult, areas used for drying cloves becoming congested.

Condition of Trees.—The condition of trees is satisfactory. They did not suffer unduly from the dry spell which lasted from the middle of May till the end of August and which delayed the development of the young flower-buds. In spite of the heavy crop there was little sign of branch-breaking—a beneficial result perhaps of labour scarcity.

Cultivation.—During the first nine months of the year all clove areas received regular attention and were clean and in a good state of cultivation when heavy picking commenced. During the last three months of the year all cultivation operations were abandoned in favour of clove picking. This, together with the persistent rains at that time, unavoidably caused the areas to have an appearance of neglect at the close of the year.

Considerable work was done on Masingini Plantation in the making of contour trenches and the planting of *Leucaena glauca* for the purpose of arresting soil erosion.

Supplying.—5,370 selected seedlings from public nurseries under the control of the Experimental Section were bought and planted. Owing to the *Masika* rains stopping at an early date and the following three and a half months' dry spell, a large percentage failed to become established.

Plantation Cloves.—Of this season's crop, 265,228 lbs. (118 tons, 8 cwt.) of dry cloves were sent to Town before the end of the year and realized Shs. 97,790.09 cents (£4,889.5) giving an average of Shs. 36.87 cents per 100 lbs. The following table shows how this figure compares with previous seasons.

TABLE I.

AVERAGE AMOUNT REALIZED PER 100 LBS. OF DRY CLOVES.

Season.	1937/38.	1936/37.	1935/36.	1934/35.	1933/34.
	Shs. Cts.	Shs. Cts.	Shs. Cts.	Shs. Cts.	Shs. Cts.
Amount	... 36 87	52 23	36 40	31 90	28 70

Green cloves picked in 1937 but not ready for sale by the end of the year produced 27,815 lbs. of dry cloves which eventually realized Shs. 10,913.53 cents. This sum is treated as carry-over valuation.

Plantation Stems.—Owing to the shortage of labour and congestion of drying areas, there were on hand in the Plantations at the end of the year considerable stocks of stems which had not been cleaned. 18,008 lbs. of stems were sent to Town and realized Shs. 1,195.32 cents, giving an average of Shs. 6.64 cents for 100 lbs. of cleaned stems.

COCONUTS.

Harvesting.—On the six plantations, which were unaffected by sales, it was found that the 1937 production of coconuts is 17% above that of the previous year, the respective figures being 37.1 nuts per tree in 1937 and 31.7 nuts in 1936.

The production for all plantations operated amounted to 3,077,969 nuts which added to 107,236 nuts bought from the Experimental Section, gave a total of 3,185,205 nuts to be accounted for:—

	No. of Nuts.	% of crop.
Made into copra	... 2,690,039	84.45
Sold on the heap	... 385,313	12.10
Rotten	... 21,211	0.67
Used for seed	... 512	0.02
Carried over to 1938 at Shs. 22 per 1,000	88,130	2.76
Total	... 3,185,205	100.00

Cultivation.—Until the clove harvest started in full force, routine operations were carried out on all plantations except Mtoni. All dairy herds have been evacuated from town for health reasons and a number have been centralised on Mtoni Plantation. The cattle now keep the area clean by grazing and the dung from the paddocks is buried in trenches dug between the lines of palms. The effects of this change will be reported on subsequently.

Planting.—The regeneration area at Machui Plantation has been maintained and slightly extended. A start was made with similar work at Selem Plantation, where some supplying has also been done.

Sale of Nuts.—Owing to the larger yield of nuts and the desertion of members of the copra-making gangs due to the financial attraction of clove harvesting, 12.10% of the nuts produced have been sold as against 11.88% the previous year. 14,000 and 600 nuts were supplied at current market prices to the Prisons and Dole Rural Middle School respectively. The remaining 370,713 nuts were sold on the heap for Shs. 10,899.27 cents, giving an average of Shs. 29.40 cents per 1,000 nuts. Comparison with previous years is given in Table II below.

TABLE II.
AVERAGE AMOUNT REALIZED PER 1,000 NUTS.

Year.	1937.	1936.	1935.	1934.
	Shs. Cts.	Shs. Cts.	Shs. Cts.	Shs. Cts.
Amount	... 29 40	29 11	22 41	10 95

Leasings.—The crops of Town areas and certain other plantations not operated were leased quarterly and produced a net revenue of Shs. 7,563.22 cents after $\frac{1}{2}$ % commission had been paid to the broker. The gross revenue per tree for the year amounted to 69 cents per tree. Comparison with previous years is given in Table III below.

TABLE III.
AVERAGE AMOUNT REALIZED PER COCONUT TREE LEASED.

Year.	1937.	1936.	1935.	1934.
	Cents.	Cents.	Cents.	Cents.
Amount	... 69	59	37	16

COPRA.

Manufacture of Copra.—428 tons 5 cwt. of copra were made at the rate of 6,281 nuts per ton. In 1936 and 1935, the rates were 6,219 and 6,180 nuts per ton respectively.

63.5% of the copra was made on the sand-bath type of kiln and the balance of 36.5% on the Ceylon type. The latter type of kiln has been modified so that the fuel is burnt in 40-gallon drums and the smoke led away by a flue. The sand-bath kiln still turns out better copra than the modified Ceylon type and this is supported by the average prices of Shs. 11.17 cents and Shs. 10.97 cents per 100 lbs. realized respectively. A Ceylon type kiln of permanent construction and capable of taking a fresh charge of 1,500 nuts every day costs about Shs. 1,200 whereas a sand-bath kiln which takes a charge of 2,000 nuts every fifth day costs about Shs. 800. Costs of repairs are likely to be greater on the latter than the former.

Plantation Copra.—422 tons 17 cwt. of copra were sold during the year by our copra agents, the Clove Growers Association, and realized Shs. 105,355.79 cents (£5,268) or Shs. 11.12 cents per 100 lbs. Comparison with previous years is given in Table IV below.

TABLE IV.

AVERAGE AMOUNT REALIZED PER 100 LBS. OF COPRA.

Year.	1937.		1936.		1935.		1934.		1933.		1932.	
	Shs. Cts.		Shs. Cts.		Shs. Cts.		Shs. Cts.		Shs. Cts.		Shs. Cts.	
Amount	...	11 12	10 63		8 45		5 36		6 50		10 05	

The agents' commission amounted to Shs. 2,368.14 cents being charged at the rate of 25 cents per 100 lbs. The net revenue was therefore Shs. 102,987.65 cents or Shs. 10.87 cents per 100 lbs. During the year the highest price realised was Shs. 14.95 cents per 100 lbs. for 46 bags of best quality in the month of March and the lowest was Shs. 8 for 6 bags of inferiors in the month of December.

At the end of the year stocks of copra unsold amounted to 12,039 lbs. which subsequently realised Shs. 1,036.88 cents net, which is treated as carry over.

Cost of Manufacture.—Table V below shows the cost of manufacturing, the revenue and the balance available on the 959,292 lbs. of copra made from the 2,690,039 nuts.

TABLE V.

		Actual Amount.		Per ton.	
		Shs.	Cts.	Shs.	Cts.
Value of 2,690,039 nuts at Shs. 29.40 per 1,000	...	79,087	15	184	67
Cost of manufacture	...	8,876	96	20	73
" " night-watchmen, cleaning, bagging, etc.	...	3,365	31	7	86
" " transport of nuts, outlying heaps to kiln	...	1,099	08	2	57
" " transport of copra to Town	...	1,565	76	3	62
" " repairs to kilns	...	2,167	96	5	06
		96,162	22	224	51
Net revenue on 959,292 lbs. of copra	...	104,024	53	242	91
Balance available for supervision and profit	...	7,862	31	18	40

REPAIRS TO PLANTATION HOUSES.

The major works of the year consisted in the reconstruction of the produce store at Masingini Plantation and the construction of two headmen's houses at Kidichi Plantation. Normal minor works in the way of repairs were undertaken and this included the putting in order of the clove pickers' *bandas* in readiness for the harvest. The permanent *banda* at Selem Plantation was provided with guttering leading into two new tanks.

REPAIRS TO COPRA FACTORIES.

The major work under this head was the construction of a sand-bath type kiln at Chukwani Plantation which superseded the old smoke-drying type and which is the first of its kind in that neighbourhood.

Most of the kilns at Machui and Dunga Plantations were overhauled, new corrugated iron sheets being fitted. These kilns are of the sand-bath type. Other normal repairs were undertaken as required.

REPAIRS TO SAKAFU.

The only work under this head undertaken was the providing of a surrounding wall to the concrete clove-drying floor at Dunga Plantation.

ACCOUNTING.

The financial year under review, which is the calendar year, ended with the clove harvest at its height. This meant that certain quantities of raw produce upon which harvesting and processing charges fell within the year, were not ready for sale at the close of the year. With the exception of clove-stems, the values of such stocks have been credited, at the prices at which they were eventually sold, to the 1937 account under the appropriate heads. As a safeguard against over-valuation of copra, coconut and clove stocks, no valuation has been placed upon the stocks of uncleaned clove-stems.

In common with all plantation owners, Government Plantations have benefitted by the heavy clove crop and steady prices. In addition the coconut crop was a good one and the average prices higher than for many years, although the market was dropping throughout the year. As a result of these factors the adjusted revenue of £11,713 was high and exceeded gross expenditure by £3,472. Under expenditure is included pension commitments and passages, the latter being non-recurrent.

Table VI shows how this excess was arrived at.

TABLE VI.

	Shs.	Cts.	Shs.	Cts.	£
Revenue from sale of cloves	...	97,790 09			4,889.5
„ „ stems	...	1,195 32			59.8
„ lease of crops	...	686 00			34.3
Value of carry-over of cloves	...	10,913 53			545.7
			110,584	94	
Revenue from sale of coconuts	...	11,328 33			566.4
„ „ copra	...	102,987 65			5,149.4
„ lease of crops	...	7,563 22			378.2
„ lease of plantations	...	600 00			30.0
Value of carry-over of coconuts	...	1,938 86			96.9
„ „ copra	...	1,036 88			51.8
			125,454	94	
Miscellaneous Revenue	...	1,430 70			71.5
			1,430	70	
			237,470	58	11,873.5
Less cost of nuts bought	...		3,208	21	160.4
Adjusted Revenue			234,262	37	11,713.1

EXPENDITURE.

	Shs.	Cts.	£
Headquarters Division : Personal Emoluments	...	20,077 67	1,003.9
Other Charges	...	1,122 24	56.1
Field Division : Personal Emoluments	...	11,334 57	566.7
Other Charges	...	124,241 42	6,212.1
		156,775 90	7,838.8
Passages (non-recurrent)	...	4,530 00	226.5
Pension commitments	...	3,514 00	175.7
Gross Expenditure	...	164,819 90	8,241.0
Adjusted revenue exceeds gross expenditure by	...	69,442 47	3,472.1

The period 1933/37 inclusive gives a better representation of the financial situation. From Table VII it will be seen that for this five year period adjusted revenue exceeded gross expenditure by £5,029.

TABLE VII.

	£
Adjusted revenue for cloves	... 17,165.5
„ „ coconuts	... 21,700.1
Miscellaneous Receipts	... 445.4
	39,311.0

EXPENDITURE.

Headquarters Division : Personal Emoluments	...	5,170.2
Other Charges	...	1,030.5
Field Division : Personal Emoluments	...	3,524.6
Other Charges	...	23,731.0
		33,456.3
Add pension commitments	...	826.0
Gross Expenditure	...	34,282.3
Adjusted revenue exceeds gross expenditure by	...	5,028.7

Detailed accounts for the 16 individual plantations (Town areas being counted as two only) have been kept as in the previous four years. In Table VIII is presented in summary form a statement of the financial position of the principal plantations for the four year period, 1933/36 inclusive, for the current year and for the five year period 1933 to 1937 inclusive. There are still extensive areas, notably at Mtoni, Kigomeni and Kidichi, which are planted up with cloves and coconuts and require cultivation although they have not reached the bearing stage.

TABLE VIII.
FINANCIAL POSITION OF PRINCIPAL PLANTATIONS, 1933-1937.

Plantations.	Period 1933-36.				1937.				Period 1933-37.			
	Excess.		Deficit.		Excess.		Deficit.		Excess.		Deficit.	
	Shs.	Cts.	Shs.	Cts.	Shs.	Cts.	Shs.	Cts.	Shs.	Cts.	Shs.	Cts.
Machui	17,197	60	—	—	23,679	87	—	—	40,877	47	—	—
Dunga	8,650	91	—	—	9,017	25	—	—	17,668	16	—	—
Selem	8,200	52	—	—	19,578	53	—	—	27,779	5	—	—
Mtoni	—	—	2,836	89	2,763	24	—	—	—	—	73	65
Chukwani	—	—	2,703	35	1,707	1	—	—	—	—	996	34
Mazizini	—	—	1,113	78	450	68	—	—	—	—	663	10
Masingini	2,315	28	—	—	7,542	66	—	—	9,857	94	—	—
Miwani	1,068	16	—	—	969	4	—	—	2,037	20	—	—
Bet-el-Ras	2,317	25	—	—	1,480	50	—	—	3,797	75	—	—
Kigomeni	—	—	1,189	5	432	13	—	—	—	—	756	92
Kidichi	—	—	—	—	—	—	936	59	—	—	936	59
Mean	31,906	65	—	—	66,684	32	—	—	98,590	97	—	—

APPENDIX VI.

Report of the Government Chemist.

CHEMICAL WORK.

The chemical work of the Laboratory is summarised below under A. General Analyses, B. Agricultural Investigations and C. Miscellaneous.

A. General Analyses.

The total number of samples received was 495, of which 411 were from Government Departments, 50 from the Clove Growers Association, and 34 from private firms.

A sum of Shs. 818.75 cents was received in fees by Government for samples analysed for the C.G.A. and private firms.

The distribution of the samples is shown in Table 1.

TABLE I.

Department.	1st quarter.	2nd quarter.	3rd quarter.	4th quarter.	Total.
Agriculture	57	68	99	99	323
Health	4	4	5	4	17
Police	19	—	1	6	26
Customs	6	8	14	4	32
Other Departments	4	3	6	—	13
Total Government	90	83	125	113	411
C.G.A.	—	46	3	1	50
Private	11	18	4	1	34
Total	101	147	132	115	495

Details of the Government samples are as follows:—

Agriculture.—Cloves, clove stems, 42; clove oil, 200; copra, 1; cattle dips, 23; milk, 50; other samples, 7; Total, 323.

Health.—Milk, 10; water, 5; toxicological, 2; Total, 17.

Police.—Opium, 3; bhang (Indian Hemp), 8; liquors, 15; Total, 26.

Customs.—Condensed milk, 26; methylated spirit, 4; other samples, 2; Total, 32.

Other Departments.—Post Office: medicines, 11; Public Works and Electricity: distilled water, 1; Education: milk, 1; Total, 13.

Notes on the More Important Samples.

Agriculture.—The Inspector of Produce submitted 13 samples of cloves for determination of moisture. Of these 8 exceeded the 16% limit, one containing 33.8%.

A sample of clove dust, petals, etc., gave only 4.9% of oil, and one of stems containing a rather large proportion of small "knuckle" stems gave 7.75%.

The oil content of 21 samples of green cloves from individual trees was determined, but the difficulty of obtaining entirely representative samples by the method adopted rendered the results inconclusive.

Six samples of clove stems, dried in different ways, were analysed; they are referred to in B. below.

Two hundred samples of clove oil from the Distillery were submitted officially by the Inspector of Produce. The factory, established in 1936 by Zanzibar Distillers, Ltd., was acquired by the Clove Growers Association in April, 1937. The samples represented 647 lbs. only of clove bud oil and 103,577 lbs. of clove stem oil, a total of approximately 46½ tons. The output has increased steadily, being 35 drums for the first quarter, 40 for the second, 57 for the third and 68 for the fourth. The stem oil has been of very uniform quality: refractive index (20°C.) 1.5350–1.5365; solubility in 70% alcohol 1/0.80–1/0.90; eugenol per cent 90.5–93.5, the great majority of samples giving 92–93 per cent.

Of 23 samples of cattle dipping fluid from tanks in charge of the Veterinary Branch five were of correct arsenical strength, 13 were below and five above strength, but in no case was the error of serious importance.

The eight samples of seasoned timbers referred to in the 1936 Report were investigated further and the experiment is still in progress.

Fifty samples of Milk from the Government Dairy, Mtoni, were analysed. On occasions it seemed doubtful whether the milk had been thoroughly mixed before sampling, but this difficulty was overcome, and the average figures given below are not seriously affected.

		Highest.	Lowest.	Average.
		%	%	%
Total solids	...	17.50	12.70	14.00
Fat	...	8.30	3.05	4.55
Solids-not-fat	...	10.05	8.50	9.45

It will be noted that no sample fell below the local legal standard for fat (3.0%) or solids-not-fat (8.5%) whilst the average composition was well above the standard.

Other samples analysed for the Agricultural Department included copra, compost, sim-sim cake, shark meal, maize germ meal and pot-experiment solutions.

Health.—Samples of Milk from public supplies were submitted by Sanitary Inspectors in nine cases where routine lactometer tests in the market indicated adulteration. In one case the deficiency of solids-not-fat was slight, and in the other samples it was below the legal standard (8.5%) by amounts varying from 9.4% to 23.5%. In six cases the offenders were summoned under the Public Health Decree, and fines of from Shs. 3 to Shs. 30 were imposed; one case was dismissed.

A sample of goat's milk gave 4.40 fat and 9.42% solids-not-fat.

Two samples of water from Pemba were analysed with satisfactory results. In connexion with Bilharzia research three samples from Zanzibar streams were examined.

The contents of a human stomach and duodenum were examined for alcohol with negative results, at the request of the Pathologist.

Police.—Opium was identified in three exhibits submitted by the Police and a pellet of opium was found in an exhibit of Bhang. Bhang (Indian Hemp) was identified in eight exhibits.

Of 13 liquor samples submitted nine were alcoholic and four non-alcoholic. No alcohol could be detected in an exhibit of sand and broken glass collected from the ground on which a bottle of suspected liquor had been broken.

A sample of methylated spirit was found to be correctly denatured but insufficiently coloured.

The rate of production of alcohol in *tembo* (juice tapped from coconut palms) and its subsequent conversion to acetic acid was investigated.

Customs.—Of 26 samples of sweetened condensed milk, 23 contained more than 9 per cent of milk fat, the range being 9.1 to 10.4 per cent and the average 9.4 per cent. Three samples, all of one brand, were rejected, the fat contents being 8.6, 8.7 and 8.7 per cent respectively. Two samples of the same brand from a later consignment contained 9.2 per cent of fat.

Four samples of methylated spirit were found to be correctly denatured.

One sample was identified as talcum powder.

No drugs prohibited under the Dangerous Drugs Decree were found in an imported native medicine.

Post Office.—No dangerous drugs were found in 11 Indian and African medicines imported through the post.

Other Departments.—A sample of milk supplied to the Hostel of the Arab Girls' School was found to be genuine.

For the Public Works Department a sample of distilled water was tested and found pure.

Clove Growers Association.—Of the 50 samples received 35 were cloves, 10 clove stems, 2 clove sweepings and 3 clove oil.

Private.—One sample of wall-paper was examined for arsenic with positive results.

Samples received from a firm engaged in cargo surveys included 24 pieces of gunny bag, 6 sugars, timber shavings, cloth and a fez cap. In each case examination for damage by salt water was requested.

Two hundred and twenty-nine written reports were made on the above analyses.

B. Agricultural Investigations.

Soils.—Eighteen samples of soil were collected at Kizimbani Experiment Station for moisture determinations.

An investigation of the applicability of the Connecticut Experiment Station Universal Soil Testing System to Zanzibar soils was commenced, but work on this was interrupted when the Government Chemist went on leave.

Samples of "fue"—a peculiar soil stratum from Pemba—were tested. Nothing could be found to connect this soil with "sudden death" of clove trees. In connexion with this problem, clove roots from Pemba were examined, but no conclusions could be reached.

Cloves.—Some progress was made with the determination of the mineral constituents of the ash of cloves.

An investigation of the oil contents of green cloves from individual trees has been referred to in A. above. This question will be followed up during the next harvest.

Reference has also been made above to an investigation which is in progress on the oil contents of clove stems dried in different ways. Now that the local distillery is absorbing large quantities of stems their more careful preparation merits attention.

The pot experiments on clove seedlings have been continued at Kizimbani and the laboratory has supplied the requisite stock nutrient solutions.

A number of cellophane bags were made for use in clove flower fertilization experiments.

Copra.—In connexion with the coconut palm selection experiment in progress at Kizimbani the oil contents of 52 samples of copra made from the nuts of individual palms were determined. An accurate technique for sub-sampling and analysis has been worked out, but further work on the oil content of different parts of the meat of a single nut, and on methods of bulk sampling, is required before it can be stated with certainty that the oil yield of copra can be used as a factor in palm selection.

Essential Oils.—Distillation of essential oil yielding materials from the experimental plots at Kizimbani were made in the laboratory. Some of the results are shown in Table II.

TABLE II.

Material.	Specific gravity (15.5/15.5).	Refractive index (20°C).	Optical rotation.	Solubility in 70% alcohol.	Other Tests.
Vetiver roots (Java strain) ...		1.5179			
Vetiver roots (Reunion strain <i>via</i> Uganda) ...		1.5250			
Lemon grass (local strain) ...	0.8850	1.4855	-0.25°	1/1.8	Citral 66% (?)
Lemon grass (Amani strain) ...	0.8871	1.4860	-0.15°	1/1.85	70.5% (?)
Bigaradia (Petitgrain) ...	0.8896	1.4603	-4.18°	1/1.85	
Cinnamon leaf ...	1.0561	1.5341		1/1.1	Eugenol 81.0%
Ginger grass (Java strain) ...	0.9369	1.4910	-24.88°	Insol.	

Derris.—A partial examination of a sample of Derris roots was made. The ether extract was low. Further tests were abandoned as it was decided not to propagate this variety.

Blood.—At the end of the year methods of utilizing waste blood from the slaughter-house, as poultry food or manure, were being studied.

C. Miscellaneous.

Several solutions were prepared for the Pathologist, Medical Department.

At the request of the Curator of the Museum experiments were made on methods of using paradichlorobenzene economically as a preservative in museum exhibition cases.

The Government Chemist prepared solutions for and supervised a practical chemistry examination at the Government Secondary School at the request of the Education Department.

OTHER WORK.

Whilst on leave the Government Chemist paid visits to the Imperial Institute, East Malling Research Station, and the London Agents of the C.G.A. Distillery, and made useful contacts.

Except during absence on leave, the Government Chemist attended all meetings as a Member of the Board of Management of the Clove Growers Association and was frequently called on at other times for advice on technical matters.

